YiChang Shih

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EXPERIENCES

Senior Software Engineer, Google Inc., Aug 2017 – present
Improved the quality of photos, videos, and preview captured by Pixel and Android camera.

- **Product**: *Google Pixel 3*, released in 2018.
- **Feature**: wide-angle distortion correction on faces.
    - Delivered the world-first, fully automatic, face-aware image distortion correction. The feature is critical for the Pixel 3 wide-angle group selfie, and highly appreciated by users and reviewers.
    - Combined HW+AI+SW to optimize the image correction warp, and generate natural look on human faces, even the subjects stand near the corners and edges of the wide-angle camera.
    - Published in SIGGRAPH 2019 (see publications below and press).
- **Feature**: image warping framework on Pixel.
    - Cross-stack mesh warping framework from camera HAL, Framework, and App.
    - Used the framework to develop optical distortion correction on Pixel 3 wide-angle camera.
- **Feature**: synthetic fill flash.
    - Brightened the human subjects to match the background exposure.
    - Integrated and optimized the core algorithm into the photo capture pipeline.

Research Scientist, Light Inc., Mar 2015 – Aug 2017
Core algorithms for multi-camera imaging system on mobile platform.
Lead various product features and researches on computational photography.

- **Product**: *the Light L16 camera*, released in 2017.
    - Compact camera that uses computational photography to combine 16 different images into a single, stunningly detailed photo, from 28mm to 135mm.
    - Participated in the full product R&D cycles from the prototype, factory manufacturing, testing (Foxconn), and imaging pipeline software development.
- **Feature**: depth from multi-view stereo.
    - Computed the scene depth map from 10 different cameras on one mobile platform.
    - Developed sparse and coarse-to-fine multi-view matching algorithm for efficient processing.
    - Robust occlusion and calibration tolerance handling.
- **Feature**: dynamic online calibration.
    - Refined the camera calibration parameters for every shot to compensate mechanical tolerance.
    - Delivered multiscale and multi-view feature matching algorithm for robust bundle adjustment.
    - Delivered the calibration tuning tool by visualizing epipolar geometry and reprojection errors.
- **Feature**: multi-view image fusion.
    - High-quality image denoising algorithm using RAW sensor data from 5 different cameras.
    - Delivered the efficient algorithm using wavelet transform and robust matching.
- Multi-view imaging pipeline design and optimization.
    - Developed the image processing pipeline.
      Demosaicking, bad pixel correction, calibration, lens correction, and perspective correction.
    - Optimized the system with SIMD (NEON and SSE) and multi-threading.
    - Built the software stack release process and regression tests.

Software Engineer Intern, Google [x], Jun 2014 - Sep 2014

- Efficient depth-from-stereo algorithm using bilateral solver.
- Published in CVPR 2015 (see publications below).

- Advisor: Marc Levoy and Jon Barron.

Research Intern, Adobe Research, Jun 2013 – Sep 2013

- Style transfer algorithm for portrait pictures.
- Published in SIGGRAPH 2014 (see publications below and press).
- Advisor: Sylvain Paris and Connelly Barnes.

Research Intern, Google Research, Jun 2012 – Sep 2012

- Image denoising algorithm for face pictures in Google+.
- Published in ICCV 2013 and patents (see publications below and project web).
- Advisor: Vivek Kwatra and Troy Chinen.

Research Intern, Microsoft Research, Jun 2011 – Sep 2011

- Lens simulation, calibration, and image enhancement for mobile phone camera.
- Published in ECCV 2012 and patents (see publications below and project web).
- Advisor: Neel Joshi and Brian Guenter.

Research Assistant of Frédo Durand and William T. Freeman, MIT CSAIL, 2010 – 2015

Teaching Assistant at the Department of EECS, Massachusetts Institute of Technology.

EDUCATION

2010 – 2015 **Ph.D.** in Computer Science, Massachusetts Institute of Technology, Cambridge, MA
Advisor: Frédo Durand and William T. Freeman

2010 – 2012 **M.S.** in Massachusetts Institute of Technology, Cambridge, MA
Major: Electrical Engineering and Computer Science. GPA:5.0/5.0.

2005 – 2009 **B.S.** in National Taiwan University, Taipei, Taiwan.
Major: Electrical Engineering. Rank: Top 1% (1st / 191). GPA: 4.0/4.0. Minor: Physics.

SELECTED PUBLICATIONS

[1] **YiChang Shih,** Wei-Sheng Lai, Chia-Kai Liang, "*Distortion-Free Wide-Angle Portraits on Camera Phones*", SIGGRAPH 2019.

[2] Michaël Gharbi, **YiChang Shih,** Gaurav Chaurasia, Jonathan Ragan-Kelley, Sylvain Paris, and Frédo Durand, "*Transform Recipes for Efficient Cloud Photo Enhancement*", SIGGRAPH ASIA 2015.

[3] **YiChang Shih,** "*Data-Driven Photographic Style Using Local Transfer*", PhD Dissertation.

[4] Jon Barron, Andrew Adams, **YiChang Shih,** and Carlos Hernandez, "*Fast Bilateral-Space Stereo for Synthetic Defocus*", CVPR 2015.

[5] **YiChang Shih**, Dilip Krishnan, Frédo Durand, William T. Freeman, "*Reflection Removal using Ghosting Cues*", CVPR 2015.

[6] **YiChang Shih**, Sylvain Paris, Connelly Barnes, William T. Freeman, Frédo Durand, "*Style Transfer for Headshot Portraits*", SIGGRAPH 2014.

[7] L. Pickup, Z. Pan, D. Wei, **Y. Shih**, W. Freeman, A. Zisserman and B. Schölkopf, "*Seeing Through the Arrow of Time*", CVPR 2014.

[8] **YiChang Shih**, Sylvain Paris, Frédo Durand, William T. Freeman, "*Data-driven Hallucination of Different Times of Day from a Single Outdoor Photo*", SIGGRAPH ASIA 2013.

[9] **YiChang Shih**, Vivek Kwatra, Troy Chinen, Hui Fang, Sergey Ioffe, "*Joint Noise Level Estimation from Personal Photo Collections"*, ICCV 2013.

[10] **YiChang Shih**, Brian Guenter, Neel Joshi, "*Image Enhancement using Calibrated Lens Simulations"*, ECCV 2012.

[11] **YiChang Shih**, Abe Davis, Samuel W. Hasinoff, Frédo Durand, William T. Freeman, "*Laser Speckle Photography for Surface Tampering Detection*", CVPR 2012.

[12] Chia-Kai Liang, **YiChang Shih**, and Homer Chen, "*Light field analysis for modeling image formation*", IEEE Transactions on Image Processing.

PATENTS

US Patent 9,659,352: Image denoising system and method.

US Patent 9,137,526: Image enhancement via calibrated lens simulation.

US Patent 9,131,118: Laser speckle photography for surface tampering detection.

US Patent 8,977,012: Image denoising system and method.

ACADEMIC SERVICES

Reviewer:

ACM TOG, ACM SIGGRAPH, ACM SIGGRAPH Asia, IEEE TIP, IEEE TMM, IEEE TPAMI, IJCV, CVIU, IEEE TVCJ, ICCV, CVPR, ECCV, ACCV, Optics Express, PG, Image and Vision Computing, EGSR, IEEE ICIP, ICASSP. Sensors, IEEE Signal Processing Letters.

PROGRAMMING

C/C++, C#, Python, Java, UNIX shell script, OpenCV, OpenGL, Eigen.

HONORS

- Google Student Travel Awards for my paper in CVPR2012
- Morris Joseph Levin Award for best master thesis presentation
- 2010 The Presidential Graduate Fellowship Award at Massachusetts Institute of Technology
- 2004 Silver Medal, International Physics Olympiads (IPhO)
- Presidential Award (top 5%, amount to 6 semesters, 2005 ~2008)

REFERENCES

Available on request.